

We claim:

- 5
- 10
- 15
- 20
- 25
- 30
- 35
1. A method of releasing a glazing panel from a frame to which the panel is bonded by interposed bonding material, the method comprising:
 - i) arranging light energy delivery means adjacent the glazing panel; and,
 - ii) operating the light energy delivery means to transmit light energy through the screen to effect release of the panel from the frame.
 2. A method according to claim 1, wherein the light energy delivered is of a wavelength substantially in the range 300nm-1500nm.
 3. A method according to claim 2, wherein the light energy delivered is of a wavelength substantially in the range 400nm-700nm.
 4. A method according to claim 1, wherein the light energy delivered comprises a plurality of wavelengths.
 5. A method according to claim 1, wherein the light energy delivered is pulsed according to a predetermined regime.
 6. A method according to claim 5, wherein the pulse duration (T on) is substantially in the range 1 μ s-100ms.

7. A method according to claim 6, wherein the pulse duration is substantially in the range 1ms-2ms.

B 5 8. A method according to claim 1, wherein the pulse ~~repetition~~ frequency is substantially in the range 0.1Hz-10Hz.

B 10 9. A method according to claim 1, wherein the pulse ~~repetition~~ frequency is substantially in the range 0.3Hz-1Hz.

10. A method according to claim 1, wherein the pulse duration (T on) is less than the inter-pulse interval (T off).

15 11. A method according to claim 5, wherein a single pulse of light energy delivered is of sufficient energy to effect separation of the screen from the frame along a length of the bonding material.

20 12. A method according to claim 1, wherein the light energy delivery means is hand held and positionable relative to the glazing manually by an operator.

25 13. A method according to claim 1, wherein the light energy attenuates rapidly with distance such that at a few centimetres from the energy delivery means the light energy density is significantly diminished from its maximum value. *Diminished*

B 30 14. A method according to claim 13, wherein at a distance substantially in the range 5cm or less from the delivery means the light energy density is 50% maximum value, or below.

35

15. A method according to claim 1, wherein the light energy is non-coherent.

5

16. A method according to claim 1, wherein the energy delivery means comprises electrical gas discharge apparatus.

10

17. A method according to claim 16, wherein operation of the gas discharge apparatus is controlled to limit the pulse rate and/or duration of the light pulse.

18. A method according to claim 17, wherein the operation of the gas discharge apparatus is controlled by:

15

i) charging a capacitor arrangement;

ii) initiating a trigger pulse to discharge the capacitor arrangement; and,

20

iii) discharging the capacitor arrangement through an inductor to the gas discharge apparatus.

25

19. Apparatus for releasing a glazing panel from a frame to which the panel is bonded by interposed bonding material, the apparatus comprising light energy delivery means arrangeable adjacent the glazing panel, and operable to transmit light energy through the screen to effect release of the panel from the frame.

30

20. Apparatus according to claim 19, which is controllable to pulse the light energy delivered.

35

21. Apparatus according to claim 20, wherein the apparatus is controllable to adjust and/or limit:

the pulse repetition rate of the light delivered; and/or,

the pulse duration of the light delivered, and/or,

the light intensity delivered.

22. Apparatus according to claim 19, wherein the light energy delivery means includes a manual trigger for initiating a light pulse when the delivery head is positioned to the operators satisfaction.

23. Apparatus according to claim 19, wherein means is provided for selectively adjusting the intensity of the light delivered.

24. Apparatus according to claim 19, wherein the apparatus includes different preset settings which may be switched to alter one or more parameters of the light energy delivered, dependent upon the tint of the glazing panel to be debonded.

25. Appartus according to claim 24, wherein the light energy parameters include:

light intensity; and/or,

pulse duration; and/or,

pulse interval.

26. Apparatus according to claim 19, wherein the energy

delivery means comprises electrical gas discharge apparatus.

5

27. Apparatus according to claim 25, including a pulse forming network having a capacitor and inductor arrangement in which the capacitor discharges through the inductor to drive the electrical gas discharge apparatus to produce a light pulse.

10

28. Apparatus according to claim 27, including a trigger network for initiating the capacitor of the pulse forming network to discharge.

15

29. Apparatus according to claim 26, including control means for controlling one or more apparatus parameters including the minimum permissible time elapsing between subsequent discharge pulses of the electrical gas discharge apparatus.

20

30. Apparatus according to claim 26, wherein the discharge apparatus comprises an electrical gas discharge tube.

25

31. Apparatus according to claim 26, wherein the electrical gas discharge apparatus comprises a reflector arranged to direct emitted light in a predetermined direction.

30

32. Apparatus according to claim 19, wherein the apparatus comprises a window through which emitted light is directed to pass through the glazing panel.

35

33. A method according to claim 1, wherein the energy delivery means comprises laser energy delivery means operated to transmit laser radiation through the

09184186 14299

panel to effect release of the glazing panel from the frame, the laser being operated in quasi continuous wave mode in which a series of discrete pulses of radiation are transmitted.

5

34. A method according to claim 33, wherein the laser radiation is focussed to a line at the interface between the bonding material and the panel.

10

35. A method according to claim 34, wherein the focussed line has a line width substantially in the range 200-800 μ m.

15

36. A method according to claim 34, wherein the focussed line has a line width substantially in the range 600 μ m \pm 20%.

20

37. A method according to claim 33, wherein the laser delivery means is tracked about the panel at a pre-determined rate, the tracking and quasi-continuous wave pulsed operation of the laser delivery means being coordinated such that the focussed line moves in the direction of its width at a rate such that subsequent pulses of the focussed line overlap.

25

38. A method according to claim 37, wherein the degree of linewidth overlap of subsequent pulses is substantially 50% or above.

30

39. A method according to claim 37, wherein the degree of linewidth overlap of subsequent pulses is substantially 80% or above.

35

40. A method according to claim 33, wherein the laser energy delivery means is hand held and positionable relative to the glazing manually by an operator.

05184185 410298

41. A method according to claim 33, wherein the wavelength of the laser energy is substantially in the range 650-1000nm.

5

42. A method according to claim 33, wherein the wavelength of the laser energy is substantially in the range 650-750nm.

10

43. Apparatus according to claim 33, wherein the laser delivery means comprises a plurality of laser sources arranged in one or more arrays.

15

44. Apparatus according to claim 33, wherein the laser delivery means comprises laser diode means.

~~45. A method and/or apparatus according to any preceding claim for use in releasing a vehicular glazing panel from a supporting frame.~~

Add 4/2

09184156-110298

ADD 1/3